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10/672,433	09/26/2003	MacKenzie E. King	ARMI-617	8498

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EXAMINER	
OLSEN, KAJ K	

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1753	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/672,433	KING ET AL.	
	Examiner	Art Unit	
	Kaj K. Olsen	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-43* is/are pending in the application.

4a) Of the above claim(s) *18-21 and 37-42* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 22-36* is/are rejected.

7)☒ Claim(s) *43* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 18-21 and 37-42 remain withdrawn from further consideration as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 9-17 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Robertson (USP 6,758,960).

4. Robertson discloses an electrode assembly for analyzing a metal electroplating solution comprising a measuring electrode (the central electrode) and an *in situ* cleaning mechanism that comprises an auxiliary electrode and an auxiliary current source whereby the measuring and auxiliary electrodes are detachably connectable to the auxiliary current source. See fig. 1A and 1B. Robertson further teaches immersing the electrodes in an electrolytic cleaning solution (col. 2, ll. 13-21) and teaches applying an AC voltage across the measuring and auxiliary electrodes (col. 3, ll. 40-53). An AC voltage reads on the set forth "cycling electric current" because the AC voltage source applies current that will cycle over a period defined by the AC frequency.

5. With respect to the applied current densities and the number of cycles of current to be applied, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

6. With respect to the new limitation of "galvanodynamic cleaning", this issue is addressed in the arguments below.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-5, 7, 9-17, 22-25, 27, and 29-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (USP 5,192,403) in view of Wullshleger et al (USP 4,772,375).

10. Chang disclose an electrode assembly for analyzing a metal electroplating solution comprising a measuring electrode and a cleaning mechanism. The cleaning mechanism

comprises an auxiliary electrode where an auxiliary current source (i.e. a potentiostat) is connected to both the auxiliary and measuring electrodes so that when both of the electrodes are immersed in a cleaning solution, the auxiliary current source applies a cycling electric current to the measuring and auxiliary electrodes for cleaning of the electrodes. See col. 7, ll. 52-65. Although Chang does not explicitly disclose that the electrodes are detachably connectable to the auxiliary current source, it is well known in the electroanalytical art to make the various electrodes be detachably connectable to a voltage source. This is demonstrated by Wullschleger, which teaches that the cleaning voltage can be applied via a detachable connection (i.e. a switch 52) to the electrode. See fig. 1 and col. 4, ll. 49-53. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Wullschleger for the assembly of Chang so that the electrodes of Chang can be detached from the power source. With respect to the cleaning mechanism of Chang being *in situ* for cleaning the measuring electrode in a measuring chamber it is noted that this term doesn't further define any structure of the device, but merely specifies how the cleaning mechanism is to be utilized. The intended use need not be given further due consideration in determining patentability. Alternatively, even if the examiner were to interpret the term "*in situ*" to have structural meaning and were to interpret the term to mean that the cleaning mechanism must be in the same location as an unspecified measurement chamber, it is noted that Wullschleger teaches that the cleaning need not require removal of the electrode from the measurement environment, but rather can be performed *in situ*. See col. 4, l. 49 through col. 5, l. 32. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the cleaning mechanism of Chang *in situ* with the measurement environment, as taught by Wullschleger, to as

to avoid the complexity of having to physically move the measuring electrode back and forth from the measurement chamber to the cleaning chamber.

11. With respect to the new limitations about the measuring electrode being detached from the measuring circuit and attached to the auxiliary current source, Wullschleger already discloses that the measurement circuitry can be disconnected from the electrodes during the cleaning cycle. See col. 5, ll. 28-32. With respect to the new limitation of "galvanodynamic cleaning", this issue is addressed in the arguments below.

12. With respect to the applied current densities and the number of cycles of current to be applied for the apparatus claims, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. With respect to these current densities and cycles to be applied for the method claims and the apparatus claims in the alternative, finding the desired current densities and the amount of time needed for establishing the desired level of cleaning requires only routine skill in the art.

13. Claims 3-5, 7, 23-25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robertson in view of Chang.

14. Robertson set forth all the limitations of the claims, but did not explicitly recite the use of sulfuric acid for the cleaning solution. It is noted that Robertson did suggest that the electrolytic solution should contain an acid (col. 2, l. 15). Chang taught that the cleaning solution for an electrode cleaning mechanism could be 0.1 M sulfuric acid. See col. 7, ll. 52-65. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Chang for the assembly and method of Robertson because sulfuric acid was

shown to be a suitable acid for the acid cleaning of measuring electrode for an electroplating solution device.

15. Claims 6, 8, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Chang and Wullschleger or Robertson and Chang as applied to claims 5, 7, 25, and 27 above, and in further view of Faulkner et al (USP 3,950,234) or Tobiyama et al (USP 5,447,802).

16. The references set forth all the limitations of the claims, but did not explicitly recite the addition of potassium sulfate to the cleaning solution. Faulkner teaches the addition of ion salts such as potassium sulfate to an electrolytic solution in order to improve its conductivity, thereby reducing the energy requirements for the electrodes. See col. 11, l. 67 through col. 12, l. 13. Tobiyama similarly teaches that potassium sulfate can be added to a sulfuric acid solution so as to improve the conductivity of the solution. See col. 6, ll. 19-31 and table 2. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Faulkner or Tobiyama for the assembly and method of either Chang and Wullschleger or Robertson and Chang so as to improve the conductivity of the electrolytic solution. A reduced conductivity cleaning solution would have allowed the applied voltages of Chang and Robertson to provide additional current, thereby providing additional cleaning action. With respect to the desired concentration of the potassium sulfate, finding the appropriate concentration of potassium sulfate to provide the desired level of conductivity enhancement would have required only routine skill in the art.

17. Claims 29-36 (and claims 9-17 in the alternative) are rejected under 35 U.S.C. 103(a) as being unpatentable over Robertson.

18. Robertson set forth all the limitations of claims 29-36, but did not explicitly disclose either the current cycling densities or cycling rate. However, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize any of the claims ranges because finding the desired current densities and cycling rates needed for establishing the desired level of cleaning requires only routine skill in the art. Similarly, the number of cycles need for the cleaning would also have required only routine skill in the art. One possessing ordinary skill in the art would have known to apply as many cycles as is necessary to arrive at the desired level of cleanliness for the electrodes.

19. With respect to claims 9-17 in the alternative, even if the examiner were to interpret these limitations as further defining the structure of the invention, then these claims would have been obvious over Robertson for the reasons set forth above.

Allowable Subject Matter

20. Claim 43 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not disclose nor render obvious all the cumulative limitations of claims 1, 22, and 43 with particular attention to the cyclic current being applied until the electropotential measured by the measuring electrode reaches an asymptotic limit. Because both Robertson and Chang generate their cyclic current via controlled potential delivery, it would not have been obvious for either of them to monitor the result of that cleaning by measuring the electropotential

of the measuring electrode until it reaches an asymptotic limit because neither of them would ever see their potentials approach asymptotic limits. The potentials would remain whatever the potentials being applied to the electrode were.

Response to Arguments

22. Applicant's arguments filed 6-24-2007 have been fully considered but they are not persuasive. With respect to the rejection relying on the teaching of Robertson, applicant urges that Robertson applies an alternating current whereas the instant invention is drawn to the use of direct current. First, the examiner notes that the claims do not state "direct current", but rather "cycling electric current". Applicant urges that the addition of the term "galvanodynamic" to the claims reads free of Robertson because a galvanodynamic process is by definition one involving direct current. This argument is entirely confusing. The term "direct current" is defined as involving a constant current (see enclosed definition). However, the term "galvanodynamic" would presumably mean the opposite because the term --galvano-- means "current" and the term --dynamic-- implies change (see enclosed definitions). A changing current is not a constant current. Moreover, applicant's own claims contradict such an interpretation of "galvanodynamic" as implying direct current, because claim 1 states that the current is "cycling". A cycling current is not a constant (i.e. direct) current.

23. With respect to the rejection relying on the teaching of Chang, applicant urges that Chang discloses two cleaning processes and both are conducted in a separate chamber or apparatus away from the measuring chamber. First, whether or not Chang performs this cleaning away

from the chamber that the electroplating solution is being analyzed does not read away from the claims giving the claim language their broadest reasonable interpretation. In particular, in the previous office action, the examiner urged that applicant didn't define where the cleaning was to be performed to have the term "*in situ*" have any structural meaning. Applicant has amended claim 1 to state that the *in situ* cleaning mechanism is for in the measuring chamber. It doesn't appear that this further defines the structure of the invention. Applicant never claims a measuring chamber, but only a cleaning mechanism for the measuring chamber in the preamble. Hence, if Chang teaches a cleaning mechanism, but didn't utilize that cleaning mechanism within the measuring chamber, Chang would still possess all the structural elements of the cleaning mechanism and whether or not Chang performed this cleaning mechanism in the measuring chamber or in a different chamber would constitute the intended use of the cleaning mechanism. In other words, the "*in situ*" still only defines how the applicant intends to utilize the defined cleaning mechanism. Second, even if "*in situ*" were to be interpreted as structurally defining where the cleaning mechanism is located, the use of this cleaning mechanism *in situ* would still have been obvious in view of Chang and Wullschleger. In particular, as discussed in the previous office action, Wullschleger already taught that cleanings could be performed *in situ*. In addition, Chang stated that "[I]n this example, the cleaning step was performed in a separate cell" (col. 7, ll. 53 and 54) implying that other unspecified cleaning steps were performed in the same cell as the measuring chamber. In fact, it appears that main reason that this cleaning step was performed in a separate cell because Chang presumably desired a higher level of cleanliness. Applicant urges that given the "more stringent" nature of the cleaning of Chang, there would be no reason for modifying the process of Chang. The examiner disagrees. One possessing

ordinary skill in the art would have been motivated to utilize this cleaning step in the same chamber (i.e. *in situ*) provided either (a) one would be willing to accept a lower level of cleanliness in favor of the practicality of not having to physically move the electrodes or (b) one utilized a measuring chamber cleaned to the extent desired. To elaborate on (a), one possessing ordinary skill in the art recognizes that it not always necessary or even practical to perform the most stringent cleaning mechanism possible. See Chang, col. 6, ll. 36-39 where they repeatedly performed less stringent cleaning steps and see Wullschleger where they perform *in situ* cleaning instead of that same cleaning mechanism in a more rigorously controlled or cleaner environment. To elaborate on (b), a high degree of cleanliness of the measurement chamber would have been desired anyway in order to make sure the measurements are not corrupted by interferants from previous analyses.

24. Applicant further urges Chang's cleaning mechanism is drawn to potential cycling in contrast to the instant invention's use of current cycling. However, a potential cycling reads on the term "current cycling" because when potential or current are cycled, the current or potential respectively will also cycle. This is demonstrated by fig. 1 of the instant invention where they show that cycling the current causes the potential to also cycle. Hence, if Chang cycled the potential, the current would also be cyclic and read on the claimed device. Moreover, because the current of Chang would be changing (i.e. dynamic) as well, it would read on the set forth term "galvanodynamic cleaning".

25. Applicant also urges that Wullschleger only has a cleaning mode activity related to the regeneration of the lead electrode. It is unclear what the relevance of this point is because Wullschleger is only being utilized here to show that measuring electrodes can be made

detachably connectable to a cleaning voltage source so that one can switch between measurement and cleaning. Chang set forth the remainder of the claimed subject. The fact that the cleaning of Wullschleger might have taken a different form is irrelevant to how the reference is being utilized.

26. Applicant's remaining arguments appear to rely on their perceived failings of the earlier rejections relying on Robertson or Chang and Wullschleger. Because these arguments were not persuasive as discussed above, these remaining arguments are also not persuasive.

Conclusion

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
September 7, 2007

KAJ K. OLSEN
PRIMARY EXAMINER